Claims

1. A control circuit for dispersion control of electromagnetic signals in communication networks by aligning an electromagnetic signal having a peaked spectrum function including a center wavelength and a wavelength selective device implementing a peaked passband function including a center wavelength, said circuit comprising:

mechanism for applying a dither modulation signal at a dither modulation frequency to said electromagnetic signal, and inputting said dither modulated electromagnetic signal to said wavelength selective device; and

a feedback loop including

i) mechanism for converting a portion of said dither modulated electromagnetic signal to an electric feedback signal,

ii) mechanism for continuously comparing said feedback signal with said dither modulation signal and generating an error signal representing a difference between a frequency characteristic of said feedback signal and a dither modulation frequency,

iii) mechanism for applying said error signed to better align the center wavelengths of the electromagnetic signal and the wavelength selective device, wherein said center wavelength of said electromagnetic signal and said wavelength selective device center wavelength become aligned when said frequency characteristic of said feedback signal is two times said dither modulation frequency, and

iv) mechanism to selectively prevent said error signed from being applied to better align said center wavelengths.

2. A circuit according to Claim 1, wherein the mechanism to selectively prevent the error signal from being applied includes mechanism to prevent said error signal from being applied at defined times.

3. A circuit according to Claim 1, for use with a system that receives and transmits said electromagnetic signal, and wherein said system and said control circuit are initialized and re-initialized at defined times; and wherein:

the mechanism to selectively prevent the error signal from being applied includes mechanism to allow said error signal to be applied to better align said center wavelengths only at said defined times.

4. A circuit according to Claim 1, wherein the mechanism to selectively prevent the error signal from being applied include mechanism to disable the feedback loop at defined times.

5. A circuit according to Claim 1, wherein said electromagnetic signal is a laser signal having a wavelength between 1300 nm and 1550 nm.

6. A method for dispersion control of electromagnetic signals in communication networks by mutually aligning a center wavelength of an electromagnetic signal having a peaked spectrum function with a center wavelength of a wavelength selective device implementing a peaked passband function, said method comprising the steps of:

a) applying a dither modulation signal at a dither modulation frequency to said electromagnetic signal operating at a specific wavelength, and inputting said dither modulated electromagnetic signal to said wavelength selective device having a peak frequency response at a desired wavelength;

b) converting a portion of said dither modulated electromagnetic signal to an electric feedback signal;

c) selectively comparing said feedback signal with said dither modulation signal and generating an error signal representing a difference between a frequency characteristic of said feedback signal and a dither modulation frequency;

d) applying said error signal to better align the center wavelengths of electromagnetic signal and the wavelength selective device, wherein said center wavelength of said electromagnetic signal and said wavelength selective device center wavelength become aligned when said frequency characteristic of said feedback signal is two times said dither modulation frequency; and

e) selectively preventing the error signal from being applied to better align said center wavelengths.

7. A method according to Claim 6, wherein the selectively preventing step includes the step of preventing said error signal from being applied at defined times.

8. A method according to Claim 6, for use with a system that receives and transmits said electromagnetic signal, and wherein said system is initialized and re-initialized at defined times, and wherein the selectively preventing step includes the step of preventing said error signal from being applied at all times except said defined times.

9. A method according to Claim 6, wherein the selectively preventing step includes the step of preventing the error signal from being generated at defined times.

10. A method according to Claim 6, wherein said electromagnetic signal is a laser signal having a wavelength between 1300 nm and 1550 nm.

11. A control circuit for adjusting an electromagnetic signal having a peaked spectrum function including a center wavelength, said circuit comprising:

mechanism for applying a dither modulation signal at a dither modulation frequency to said electromagnetic signal;

a compression subcircuit for compressing the electromagnetic signal, and including

i) first and second dispersion mechanisms, located in series, for receiving the dither modulated electromagnetic signal and spreading the spectrum of said electromagnetic signal out in space, and

ii) a spectral filter, located in series with the first and second dispersion mechanisms, for adjusting the spectrum of the electromagnetic signal, wherein the spectral filter implements a peaked passband function including a center wavelength; and

a feedback loop including

i) mechanism for converting a portion of said dither modulated electromagnetic signal to an electric feedback signal,

ii) mechanism for continuously comparing said feedback signal with said dither modulation signal and generating an error signal representing a difference between a frequency characteristic of said feedback signal and a dither modulation frequency; and

iii) mechanism for adjusting the peak spectrum function of said electromagnetic signal according to said error signal, wherein said center wavelength of said electromagnetic signal and said spectral filter center wavelength become aligned when said frequency characteristic of said feedback signal is two times said dither modulation frequency.

12. A circuit according to Claim 11, wherein:

the first and second dispersion mechanisms include, respectively, first and second diffraction gratings.

13. A circuit according to Claim 12, wherein the spectral filter includes a spatial filter located in series with the first and second diffraction gratings.

14. A circuit according to Claim 11, wherein the compression subcircuit further includes a mirror for receiving the electromagnetic signal, and reflecting the electromagnetic signal back through the first and second dispersion mechanisms and the spectral filter; and

a portion of the electromagnetic signal passes through the mirror and is incident on said mechanism for converting to produce said electric feedback signal.

15. A method for adjusting a center wavelength of an electromagnetic signal of having a peaked spectrum function, said method comprising the steps of:

a) applying a dither modulation signal at a dither modulation frequency to said electromagnetic signal operating at a specific wavelength;

b) inputting said dither modulated electromagnetic signal to a compression subcircuit for compressing the electromagnetic signal, including the steps of (1) transmitting the dither modulated electromagnetic signal through first and second dispersion mechanisms to spread the spectrum of said electromagnetic signal out in space, and (2) passing the electromagnetic signal through a spectral filter, located in series with the first and second dispersion mechanisms, for adjusting the spectrum of the electromagnetic signal, wherein the spectral filter implements a peaked passband function including a center wavelength;

c) converting a portion of said dither modulated electromagnetic signal to an electric feedback signal;

d) continuously comparing said feedback signal with said dither modulation signal and generating an error signal representing a difference between a frequency characteristic of said feedback signal and the dither modulation frequency; and

e) adjusting the peak spectrum function of said electromagnetic signal according to said error signal, wherein said center wavelength of said electromagnetic signal and said spectral filter center wavelength become aligned when said frequency characteristic of said feedback signal is two times said dither modulation frequency.

16. A method according to Claim 15, wherein the first and second dispersion mechanisms include, respectively, first and second diffraction gratings.

17. A method according to Claim 16, wherein the spectral filter includes a spatial filter located in series with the first and second diffraction gratings.

18. A method according to Claim 15, further comprising the step of using a mirror for receiving the electromagnetic signal and reflecting the electromagnetic signal back through the first and second dispersion mechanisms and the spectral filter; and wherein the converting step includes the step of converting a portion of the electromagnetic signal passing through the mirror to the electric feedback signal.